Printed Pages : 7 **TEE-101**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2018 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. I) EXAMINATION, 2007-08

ELECTRICAL ENGINEERING

Time : 3 Hours] *[Total Marks : 100*

1 Attempt any **four** parts of the following : **5×4=20**

(a) Give analogous characteristics of electrical and magnetic ckts. **5**

(b) An iron ring is made up of three parts : **5**

$l_1 = 10\ cm$, $A_1 = 5\ cm^2$, $l_2 = 8\ cm$,

$A_2 = 3\ cm^2$, $l_3 = 6\ cm$, $A_3 = 2.5\ cm^2$. It is wound with a coil of 250 turns. Calculate current required to produce flux of 0.4 mWb.

$\mu_1 = 2670,\ \mu_2 = 1050,\ \mu_3 = 600$.

(c) Define parallel resonance. Calculate at resonance the resultant current and quality factor in terms of the parameters of a ckt. 5

(d) Find applied voltage and power loss in a ckt. shown below in **Fig. 1.** 5

The value of C is 20 μF, Current $I = 0.345\ A$.

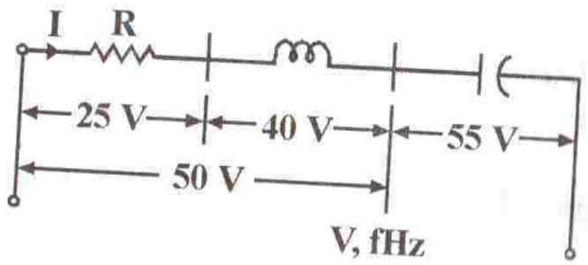

Fig. 1

(e) $z_1 = (150 - j\,157)\Omega$, $z_2 = (100 - j\,110)\,\Omega$ 5

are connected in parallel at $200\,V$, $50\,Hz$ supply. Find :

(i) I_1, I_2

(ii) I_T (Total current)

(iii) Total power

(iv) P.F. and draw phasor diagram.

(f) A series R-L-C ckt has 100 Ω resistor, 0.318 HL, and C. $v = 230 \times \sqrt{2} \sin wt V$, 5

$i = 2.3 \times \sqrt{2} \sin wt\ A$

Find :

(1) C

(2) V_L

(3) Power

take $w = 314.15\ r/sec$.

2 Attempt any **four** parts of the following : **5×4=20**

(a) Obtain equivalent Y from Δ in $Y - \Delta$ transformation. 5

(b) Using Thevenin's theorem obtain current in $13\,\Omega$ resistance in **Fig. 2**. 5

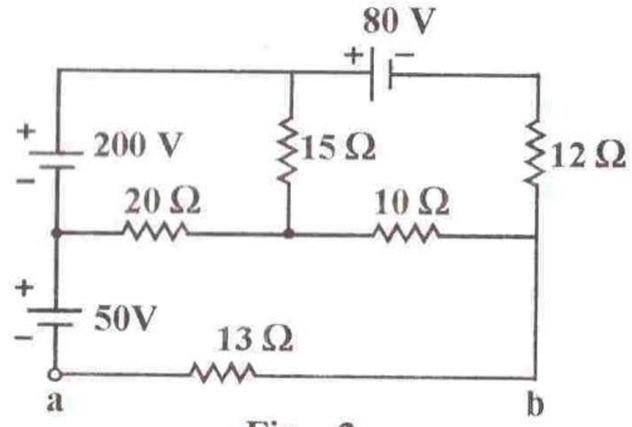

Fig. 2

(c) Using Nodal analysis, find V_{cd} for the ckt. shown below in **Fig. 3**.

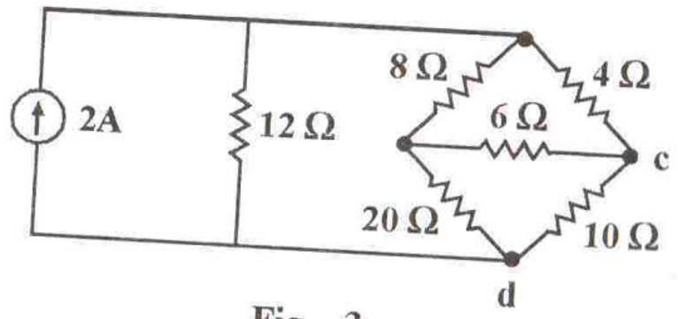

Fig. 3

(d) State and prove superposition theorem taking an example. **5**

(e) Find the Norton's equivalent ckt. as seen by R_L in the following ckt : **5**

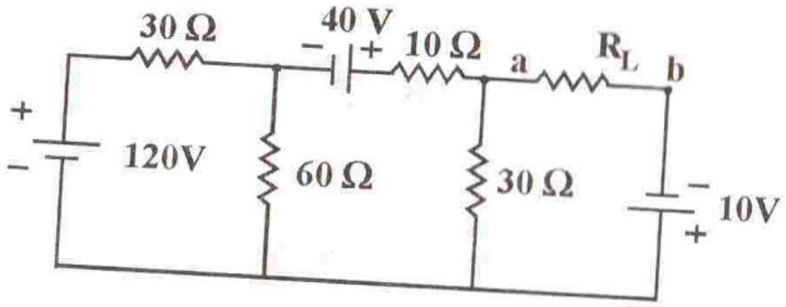

Fig. 4

(f) Calculate average and rms value of a half sine wave. **5**

3 Attempt any **two** parts of the following : **2×10=20**

(a) Explain two wattmeter method to measure $3-\phi$ power in Y-connected load. Derive the phase angle in terms of wattmeter readings. Draw phasor diagram also. **10**

(b) A $3-\phi$, 3 – wire, Y – connected system has 150 V between phase to phase. Each phase has $z = 5 \angle -30^{o}$. **10**

Find :

(1) Current in each phase

(2) Total power

(3) Draw phasor diagram.

(c) Explain the OC and SC test performed on a single phase transformer. Determine the equivalent circuit based on the above test. Derive the condition for maximum efficiency of a transformer. **10**

4 Attempt any **two** parts of the following : **2×10=20**

(a) What are different methods of speed control for DC motor ? Explain armature resistance control method. **10**

(b) Explain principle of operation of synchronous motor. Give its applications. **10**

(c) (i) Derive the emf equation for a dc machine. **10**

(ii) A 4-pole dc generator with wave connected armature has 41 slots, and 12 conductors /slot. Armature resistance $R_a = 0.5\Omega$. Shunt resistance is $R_{sh} = 200\ \Omega$. Flux per pole is 125 mWb. Speed $N = 1000$ rpm. Calculate voltage across $10\ \Omega$ load resistance across the armature terminal.

5 Attempt any **two** parts of the following : **2×10=20**

(a) Why single phase induction motor is not self starting ? What are different methods to make it self starting ? Explain one of them. **10**

(b) Why starter is needed for $3-\phi$ induction motor ? Explain $Y-\Delta$ starter with neat and clean sketch. **10**

(c) A 4-pole, $3-\phi$ induction motor runs at 1440 rpm. Supply voltage is 500 V at 50 Hz. Mechanical power output is 20.3 hp and mechanical loss is 2.23 hp. Calculate : **10**

(i) Mechanical power developed

(ii) Rotor Cu loss

(iii) Efficiency.
